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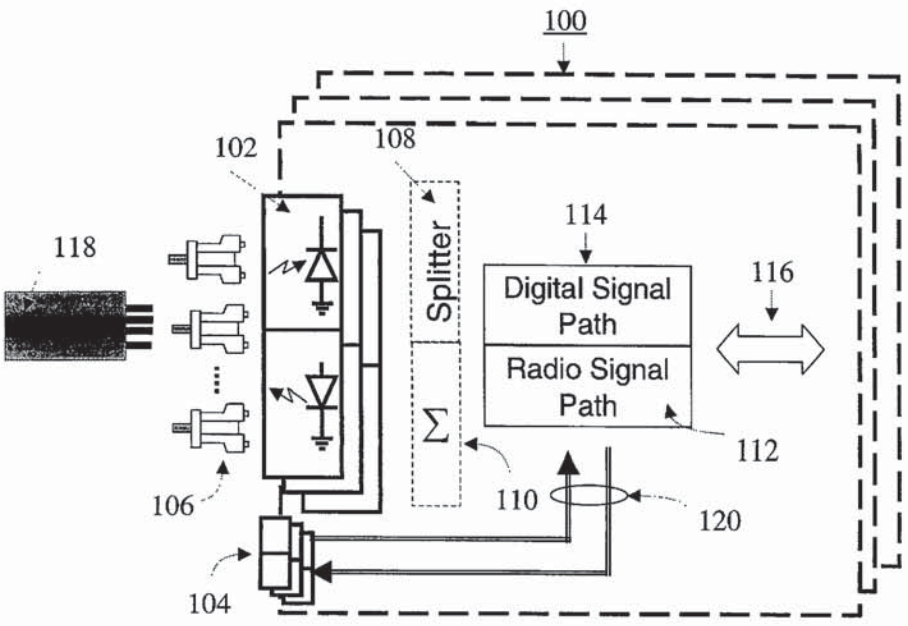
(54) Title: AN INTERFACE FOR LOCAL AREA NETWORKS



(57) Abstract: An integrated digital and analogue Radio Frequency (RF) interface (100) for transmitting combined digital and analogue RF signals over fibre based Local Area Networks (LAN). The RF signals are fed/received to/from optical transceiver(s) (102) over a separate electrical RF port (104). The digital and analogue RF signals are distributed over fibre cable (118). The architecture itself is transparent to the transmission of RF signals. The interface is integrated within LAN equipment, e.g. Ethernet or FDDI switch, and allows the distribution of the signals to different buildings or locations within a building.

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AN INTERFACE FOR LOCAL AREA NETWORKS

FIELD OF THE INVENTION

The present invention relates in general to distribution of radio signals between terminals and Base Stations, BSs, via Local Area Networks, LAN, more particular to an interface that can handle combined digital and analogue Radio Frequency, RF, signals for transmission over fibre based LANs.

BACKGROUND

Passive and active Distributed Antenna Systems (DAS) using coax or optical fibre are currently often used for Global System for Mobile communications (GSM) indoor coverage. These DASs are using a separate fibre - coax architecture to the e.g. digital Local Area Network (LAN) architecture. Multiple infrastructures are adding up in the price and increase the operation and maintenance cost.

GSM-on-the-Net uses the existing LAN architecture by connecting pico base stations to the LAN. The radio signal is distributed digitally in such a radio LAN architecture. For GSM-on-the-Net a special gateway is needed in order to ensure security from the intranet to the public network. The number of transceiver units in a pico base station is currently limited to a maximum of two transceivers. Moreover, GSM-on-the-Net cannot make use of trunking efficiency.

In buildings there are often many different cabling systems deployed, for supporting different applications:

- For LANs, Ethernet and Fibre Distributed DATA Interface (FDDI) the dominant digital transmission standards are IEEE 803.3 Gigabit Ethernet Standard and ANSI X3T12 FDDI Standard which are defined for Category 5 cable, copper twisted pair, CAT5, fibre and coax cabling.

antennas.

In the European patent application EP 792 048, "Point-routeur multiprotocoles poure réseaux indudtriels", inventor J Alexandre, is described a system for transmitting signals having different protocols on the same optical fibre. One embodiment can distribute analogue and digital signals, modulated on different bearer waves on the same optical fibre.

SUMMARY OF THE INVENTION

The present invention relates to a common digital and radio signals distribution architecture using standard Local Area Network (LAN) architecture and equipment for distributing the radio signals to remote antennas.

The present invention is using a common interface for the digital and radio signal distribution. This interface can solve multiple infrastructure problems by distributing radio signals (e.g. GSM, UMTS) between a Base Transceiver station (BTS) and its remote antennas over the fibre based LAN infrastructure. The interface is integrated in the LAN equipments (e.g. Ethernet switch or Ethernet coax to fibre media converter). Fibre in general offers a huge bandwidth and can accommodate both the digital and radio signal transmission.

The present invention uses an integrated digital and analogue Radio Frequency (RF) interface for transmitting combined digital and analogue RF signals over fibre based LANs. The RF signals are fed/received to/from optical transceiver(s) over a separate electrical RF port. The digital and analogue RF signals are distributed over the fibre-cable LAN architecture. Radio cell architecture can be built-up by connecting antennas to the electrical RF ports at the LAN equipment. The architecture itself is

transparent to the transmission of RF signals.

The present invention uses existing LAN architecture (cabling and devices), which enables low cost radio signal distribution e.g. for Distributed Antenna Systems (DASs) in buildings. The digital and radio signals are separated in the frequency domain or can be separated in the space domain by using different transceiver units in the LAN equipment or fibres in the cable. The present invention is a Distribution of Radio Signals using Local Area Network Infrastructure (DoRSuLANI) here called the interface.

One advantage by using this interface is that no gateways to the public network is needed, e.g. if compared with GSM-on-the-Net, because the radio and digital signals can be separated in the frequency domain or in the space domain by using different transceiver units in the LAN equipment. The interface can also make use of trunking efficiency as the Base Station (BS) can be centralized.

Multiple infrastructures with separate cabling and access points, e.g. fibre based LAN and passive coax DAS, are not needed. The invention allows a single cabling infrastructure with common access points.

The invention allows reduced installation, deployment and operation and maintenance (OAM) costs. The LAN can be public or private.

BRIEF DESCRIPTION OF THE DRAWINGS

A more complete appreciation of the present invention and many of the attendant advantages thereof will be readily obtained as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings, wherein:

Figure 1 shows an overview of the interface,

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